



Smoke Point in Coflow Experiment (SPICE)



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Objective:

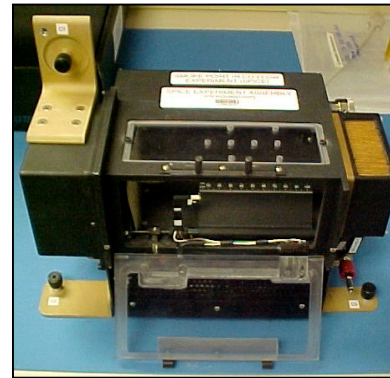
- ◆ Improved understanding of soot emission from jet flames.
- ◆ Measure smoke-point properties of jet diffusion flames in a co-flow environment as a function of nozzle diameter, co-flow velocity, fuel velocity and fuel composition.

Relevance/Impact:

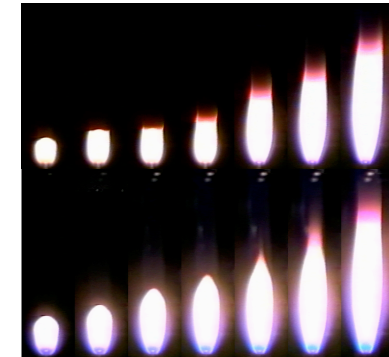
- ◆ Improved design of future space experiments using validated flame shape models and smoke height predictions.
- ◆ Support for the laminar flamelet hypothesis validation by the LSP experiment.
- ◆ Improved understanding of and ability to predict heat release, soot production and emission in microgravity fires.

Development Approach:

- ◆ Flight hardware is based on the design of the Enclosed Laminar Flames (ELF) Experiment hardware which flew on STS-87.
- ◆ Engineering model hardware used for testing purposes.
- ◆ Crew required to set up and operate the experiment. Video and data down-linked to the ground for evaluation.
- ◆ SPICE was launched on Shuttle flight ULF-2 in Nov 2008, and operated during Inc 18 and Inc 19 on board ISS in the Microgravity Science Glovebox facility.



SPICE Experiment Assembly



Figures show two distinct microgravity smoke point phenomena (open tip and closed tip).

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	38.3
Volume (m³) (w/o packing factor)	0.096
Power (kw) (peak)	0.05
Crew Time (hrs) (installation/operations)	23.25 hours crew time
Autonomous Ops (hrs)	N/A (all hands on crew ops)
Launch/Increment	ULF-2/ Increment 18

Revision Date: 08/21/2009

Project Life Cycle Schedule

Milestones	SCR	RDR	PDR	CDR	VRR	Flt Safety	FHA	Launch	Ops	Return	Final Report
Actual/ Baseline	N/A	N/A	N/A	8/1999	N/A	6/2008	8/2008	11/2008	Inc. 19/20	OPS + 4 m	Return +12m
Documentation	Website: http://spaceflightsystems.grc.nasa.gov/Advanced/ISSResearch/MSG/SPICE eRoom: https://collaboration.grc.nasa.gov/eRoom/NASAc1f1/ISSHumanResearchProjectsOffice				SRD:same as SPICE project website EDMP: http://edmp.grc.nasa.gov			Project Plan: https://collaboration.grc.nasa.gov/eRoom/NASAc1f1/ISSResearchProject/0_d1bde SEMP:			